

WHAT IS CLAIMED IS:

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1. A system for securely transmitting and storing data comprising:  
a client arrangement which encrypts sensitive data using a first key to generate pre-encrypted sensitive data, the client encrypting non-sensitive data and the pre-encrypted sensitive data using a second key; and  
a private network arrangement including:  
a record database including a set of records,  
a key-store database including a set of third keys which are encrypted using a fourth key,  
a fuzzy signature database including signature vectors which are encrypted using the first key,  
a permission database including authorization information, and  
an application server locating one of the signature vectors in the fuzzy signature database which substantially corresponds to a query request, performing at least one relational database operation on an encrypted query request, and determining if a first user is authorized to perform an operation, using the authorization information,  
wherein, if the first user is authorized, the application server obtains the fourth key for decrypting a particular key of the third keys which corresponds to particular information for a second user stored in the key-store database, and

wherein the application server decrypts the sensitive data obtained from the record database using the particular key.

2. The system of claim 1, further comprising:

a communication network arrangement connecting the private network arrangement to the client arrangement.

3. The system of claim 2, wherein the communication network arrangement is a public network arrangement.

4. The system of claim 3, further comprising:

an interface server connecting the public network arrangement to the private network arrangement.

5. The system of claim 4, further comprising:

a verification processor authenticating the interface server.

6. The system of claim 1, wherein the records include non-privileged user records and privileged user records.

7. The system of claim 1, wherein the first key is a public key of the first user.

8. The system of claim 1, wherein the second key is a public key of the application server.

9. The system of claim 1, wherein the third keys include private keys, each key corresponding to a separate user.

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10. The system of claim 1, wherein the fourth key is a key-store master key which is utilized for accessing the key-store database.

11. A system for performing a secure transfer of client data, comprising:

a client arrangement which encrypts sensitive data using a first key to generate pre-encrypted sensitive data, the client arrangement encrypting non-sensitive data and the pre-encrypted sensitive data using a second key to generate the client data.

12. The system of claim 11, wherein the first key is a public key of a user.

13. The system of claim 11, wherein the second key is a public key of the application server.

14. A method for performing a secure transfer of client data, comprising the steps of:

encrypting sensitive data of the client data using a first key to generate pre-encrypted data; and

encrypting non-sensitive data of the client data and the pre-encrypted data using a second key.

15. The method of claim 14, wherein the first key is a public key of a user.

16. The method of claim 14, wherein the second key is a public key of an application server.

17. A system for generating and storing encrypted data, comprising:

a record database which includes a set of records; a fuzzy signature database; and

an application server performing the following:

generating a first set of trigrams for each record of the records,

sorting the first set of trigrams for each record of the records,

generating signature vectors using the first set of trigrams,

wherein one of the signature vectors is assigned to a respective record residing in the record database,

encrypting the signature vectors using a key to generate encrypted vectors, wherein one of the encrypted vectors is assigned to the respective record, and

storing the encrypted vectors in the fuzzy signature database.

18. The system according to claim 17, wherein the application server:

generates a second set of trigrams for a fuzzy query, sorts the second set of trigrams, computes a query vector using the second set of trigrams, encrypts the query vector using the key to generate an encrypted fuzzy query vector, and

locates a particular vector of the encrypted vectors in the fuzzy signature database which substantially corresponds to the encrypted fuzzy query vector.

19. The system of claim 17, wherein the first set of trigrams is sorted alphabetically.

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20. The system of claim 18, wherein the second set of trigrams is sorted alphabetically.

21. The system of claim 17, wherein the record database includes non-privileged user records and privileged user records.

22. The system of claim 18, wherein the key is a public key of a user.

23. A method for generating and storing encrypted data, comprising the steps of:

generating a first set of trigrams for each record of a record database, the record database including a plurality of records;

for each record of the records, sorting the first set of trigrams;

generating signature vectors using the first set of trigrams, wherein one of the signature vectors is assigned to a respective record of the records;

encrypting the signature vectors using a key to generate the encrypted vectors, wherein one of the encrypted vectors is assigned to the respective record; and

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storing the encrypted vectors in a fuzzy signature database.

24. The method of claim 23, further comprising the steps of:  
generating a second set of trigrams for a fuzzy query;  
sorting the second set of trigrams;  
computing a query vector using the second set of trigrams;  
encrypting the query vector using the key to generate an encrypted fuzzy query vector; and  
locating a particular vector of the encrypted vectors in the fuzzy signature database which substantially corresponds to the encrypted fuzzy query vector.

25. The method of claim 23, wherein for each record of the records, the first set of trigrams is sorted alphabetically.

26. The method of claim 24, wherein the second set of trigrams is sorted alphabetically.

27. The method of claim 23, wherein the records include non-privileged user records and privileged user records.

28. The method of claim 24, wherein the key is a public key of a user.

29. A system for searching a record database which includes a plurality of records, each of the records including encrypted sensitive data, the system comprising:

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an application server encrypting a search query which includes sensitive information using a key to generate an encrypted search query, and locating a particular record of the records in the record database if the sensitive information of the particular record substantially corresponds to the encrypted sensitive information of the encrypted search query.

30. The system of claim 29, wherein the record database stores non-privileged user records and privileged user records.

31. The system of claim 29, wherein the key is a public key of a user.

32. A method for searching a record database which includes a plurality of records, each of the records including encrypted sensitive data, the method comprising the steps of:

    encrypting a search query which includes sensitive information using a key to generate an encrypted search query;  
and

    locating a particular record of the records in the record database if the sensitive information of the particular record substantially corresponds to the encrypted sensitive information of the encrypted search query.

33. The method of claim 32, wherein the record database stores non-privileged user records and privileged user records.

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34. The method of claim 32, wherein the key is a public key of a user.

35. A system for accessing encrypted sensitive data in a record database which includes a plurality of records, the system comprising:

a permission database including authorization information; and  
an application server performing the following:  
    checking the permission data in the database to determine if a first user is authorized to perform a particular operation,  
    obtaining a first key if the first user is authorized to perform the particular operation,  
    obtaining a second key using the first key,  
    decrypting the second key which corresponds to information for a second user, and  
    decrypting the encrypted sensitive data in the record database using the second key.

36. The system of claim 35, wherein the second key is located in a key-store database.

37. The system of claim 35, wherein the first key is a key-store master key.

38. The system of claim 35, wherein the second key is a private key of a user.

39. A method for accessing encrypted sensitive data in a record database which includes a plurality of records, comprising the steps of:

checking a permission data in the database to determine if a first user is authorized to perform a particular operation;

obtaining a first key if the first user is authorized to perform the particular operation,;

obtaining a second key using the first key,  
decrypting the second key which corresponds to information for  
a second user; and

decrypting the encrypted sensitive data in the record database using the second key.

40. The method of claim 39, wherein the second key is located in a key-store database.

41. The method of claim 40, wherein the first key is a key-store master key.

42. The method of claim 40, wherein the second key is a private key of a user.

43. A machine-readable medium having stored thereon data representing sequences of instructions, the sequences of instructions including particular instructions which, when executed by a processor connected to a communication network, cause the processor to perform the steps of:

encrypting sensitive data of a client data using a first key to generate pre-encrypted data; and

encrypting non-sensitive data of the client data and the pre-encrypted data using a second key.

44. A machine-readable medium having stored thereon data representing sequences of instructions, the sequences of instructions including particular instructions which, when executed by a processor connected to a communication network, cause the processor to perform the steps of:

generating a first set of trigrams for each record of a record database, the record database including a plurality of records;

for each record of the records, sorting the first set of trigrams;

generating signature vectors using the first set of trigrams, wherein one of the signature vectors is assigned to a respective record of the records;

encrypting the signature vectors using a key to generate encrypted vectors, wherein one of the encrypted vectors is assigned to the respective record; and

storing the encrypted vectors in a fuzzy signature database.

45. A machine-readable medium having stored thereon data representing sequences of instructions, the sequences of instructions including particular instructions which, when executed by a processor connected to a communication network, cause the processor to perform the steps of:

encrypting a search query which includes sensitive information using a key to generate an encrypted search query; and

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locating a particular record of records in a record database if the sensitive information of the particular record substantially corresponds to the encrypted sensitive information of the encrypted search query.

46. A machine-readable medium having stored thereon data representing sequences of instructions, the sequences of instructions including particular instructions which, when executed by a processor connected to a communication network, cause the processor to perform the steps of:

    checking a permission data in the database to determine if a first user is authorized to perform a particular operation;

    obtaining a first key if the first user is authorized to perform the particular operation;

    obtaining a second key using the first key, decrypting the second key which corresponds to information for a second user; and

    decrypting the encrypted sensitive data in the record database using the second key.